DETAILED ACTION

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on October 16, 2009 has been entered.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1, 2, 5, 7, 8, 9, 11, 15, 19, 20, 23-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mitsui et al. (U.S. Pat. 5,942,356) in view of Watanabe et al. (Japan 2001-303243).

Regarding claim 1, Mitsui teach a method for manufacturing a mask blank having a thin film for forming a mask pattern on a substrate. The thin film is formed by a sputtering method using a target comprising metal and silicon. The thin film comprised of metal, silicon and at least one of oxygen and nitrogen. The sputtering is done by

reactive sputtering in an atmosphere of at least one of oxygen gas and nitrogen gas. The sputtering target contains 70 to 90 mole percent of silicon. (Column 1 lines 5-15; Column 3 lines 7-28; Column 3 lines 45-53; Column 6 lines 60-61; Column 7 lines 25-36)

Regarding claim 5, Mitsui teach the thin film is a light semi-transmitting film and the mask blank is a phase shift mask blank. (See Abstract; Column 4 lines 35-38)

Regarding claim 7, Mitsui et al. teach patterning the thin film of the mask blank. (Column 9 lines 21-30)

Regarding claim 8, Mitsui et al. teach a sputtering target for manufacturing a mask blank by a reactive sputtering method the sputtering target comprising metal and silicon wherein the silicon is from more than 80 mol% to 95 mol% of the sputtering target. (Column 1 lines 5-15; Column 3 lines 7-28; Column 3 lines 45-53; Column 6 lines 60-61; Column 7 lines 25-36)

Regarding claim 11, Mitsui et al. teach a method for manufacturing a phase shift mask blank by sputtering in an atmosphere containing nitrogen using a target containing metal and silicon to deposit a light semi-transmitting film containing metal, silicon, and nitrogen on a transparent substrate. The sputtering is done by reactive sputtering in an atmosphere of at least one of oxygen gas and nitrogen gas. The sputtering target contains 70 to 90 mole percent of silicon. (Column 1 lines 5-15; Column 3 lines 7-28; Column 3 lines 45-53; Column 7 lines 25-36)

Regarding claim 19, Mitsui et al. teach the light semi-transmitting film has a transmittance of 9% to 20% for an exposure wavelength. (Column 5 lines 15-19)

Regarding claim 20, Mitsui et al. teach the metal in the sputtering target to be molybdenum. (Column 7 lines 30-32)

Regarding claim 23, Mitsui et al. teach the light semi-transmitting film has a transmittance of 9% to 20% for an exposure wavelength thus shielding light. (Column 5 lines 15-19)

Regarding claim 24, Mitsui et al. teach the metal in the sputtering target to be molybdenum thus excluding tantalum. (Column 7 lines 30-32)

Regarding claim 25, Mitsui et al. teach the metal in the sputtering target to be molybdenum. (Column 7 lines 30-32)

Regarding claim 26, Mitsui et al. teach the metal in the sputtering target to be molybdenum thus excluding tantalum. (Column 7 lines 30-32)

The differences between Mitsui et al. and the present claims is that the hardness of the sputtering target is not discussed (Claims 1, 2, 11, 20, 24, 25, 26), the sputtering target having a hardness of 900 HV or more in Vickers hardness (Claim 8), the sputtering target comprising a metal silicide is not discussed (Claim 9), utilizing a target with a hardness that will reduce defects in the deposited film is not discussed (claim 11) and sintering metal silicide and silicon powders to form the sputtering target is not discussed (Claim 15).

Regarding claims 1, 2, 11, 20, 24, 25, 26, Watanabe et al. teach utilizing a metal silicide target with a Vickers hardness of 1300 or less to produce films without defects because generation of particles are suppressed from the target. (See Abstract)

Regarding claim 8, Watanabe et al. teach utilizing a metal silicide target with a Vickers hardness of 1300 or less to produce films without defects because generation of particles are suppressed from the target. (See Abstract)

Regarding claim 9, Watanabe et al. teach utilizing a metal silicide target. (See Abstract)

Regarding claim 11, Watanabe et al. teach utilizing a metal silicide target with a Vickers hardness of 1300 or less to produce films without defects because generation of particles are suppressed from the target. (See Abstract)

Regarding claim 15, Watanabe et al. teach metal silicide with silicon. (Machine translation 0047)

The motivation for utilizing the features of Watanabe et al. is that it prevents particle generation from the target which produces defects in the deposited films. (See Abstract)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified Mitsui et al. by utilizing the features of Watanabe et al. because it allows preventing defects in films.

Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Mitsui et al. in view of Watanabe et al. as applied to claim 1 above, and further in view of Okubo (Japan 07-128840).

The difference not yet discussed is the use of a metal film formed on the thin film. (Claim 6)

Regarding claim 6, Okubo teach a metal film formed on a thin film. (Machine Translation Paragraph 0051)

The motivation for utilizing the features of Okubo is that it allows for preventing leakage of exposing light. (See Abstract)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have utilized the features of Okubo because it allows for preventing leakage of exposing light.

Claims 17 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mitsui et al. in view of Watanabe et al. as applied to claim 1 above, and further in view of Okubo et al. (U.S. Pat. 5,935,735).

The difference not yet discussed is the thin film is cleaned. (Claims 17, 18)

Regarding claims 17, 18, Okubo et al. teach cleaning a phase shift blank. (Colum 10 lines 66)

The motivation for utilizing the features of Okubo et al. is that it allows for cleaning. (Column 3 lines 33)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have utilized the features of Okubo et al. because it allows for cleaning.

Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Mitsui et al. in view of Watanabe et al. as applied to claim 1, 15 above, and further in view of Chiba et al. (U.S. Pat. 4,938,798).

The difference not yet discussed is sintering at a temperature of 1300 degrees C or less is not discussed. (Claim 16)

Regarding claim 16, Chiba et al. teach sintering at a temperature of 1,100 to 1,200 degrees C. (Column 4 lines 3-14)

The motivation for utilizing the features of Chiba et al. is that it allows for achieving a high density target. (Column 4 lines 3-14)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have utilized the features of Chiba et al. because it allows for achieving a high target density.

Claims 21 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mitsui et al. in view of Watanabe et al. as applied to claim 1 above, and further in view of Mitsui et al. (U.S. Pat. 6,087,047).

The differences not yet discussed is the thin film comprising metal, silicon, oxygen and nitrogen, and is formed by the reactive sputtering in the atmosphere containing more of the nitrogen than the oxygen gas is not discussed (Claim 21) and additionally using at least one of carbon, fluorine, and helium is not discussed (Claim 22).

Regarding claim 21, Mitsui et al. '047 teach utilizing oxygen and nitrogen to form a thin film comprising metal, silicon, oxygen and nitrogen. The nitrogen content is greater than the oxygen content in the atmosphere. (Column 13 lines 32-40)

Regarding claim 22, Mitsui et al. '356 discussed above teach utilizing helium in addition to other gases. (Column 12 lines 65)

The motivation for utilizing the features of Mitsui et al. '047 is that it allows for forming phase shift mask blanks. (Column 3 line 66)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have utilized the features of Mitsui et al. '047 because it allows for forming phase phase shift mask blanks.

Response to Arguments

Applicant's arguments filed October 16, 2009 have been fully considered but they are not persuasive.

In response to the argument that one of ordinary skill in the art would not have combined Watanabe with Mitsui because Watanabe teach producing electrically conductive films whereas Mitsui teach producing light semi transmissive films, it is argued that one of ordinary skill in the art would look to Watanabe because Watanabe suggest the same target material that Mitsui uses to produce films and that Watanabe recognize that a specific hardness for a metal and silicon containing target for producing films is desired in order to reduce defects when sputtering such a target during film production. (See Mitsui and Watanabe discussed above)

In response to the argument that one of ordinary skill in the art would not have combined Watanabe with Mitsui because Watanabe teach utilizing 80 mol % or less in the target and Mitsui teach utilizing 80 to 95 mol %, it is argued that both Mitsui and Watanabe utilize 80 mol % so one of ordinary skill in the art would readily consider combining Watanabe and Mitsui. (See Watanabe and Mitsui discussed above)

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Rodney G. McDonald whose telephone number is 571-272-1340. The examiner can normally be reached on M-Th with every Friday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam X. Nguyen can be reached on 571-272-1342. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Rodney G. McDonald/
Primary Examiner, Art Unit 1795

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RM
October 27, 2009